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# PATENT ABSTRACTS OF JAPAN

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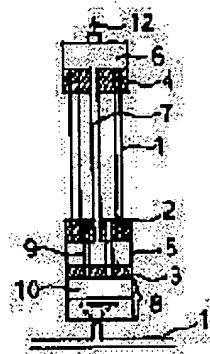
(72)Inventor : ITO GIICHI

## (54) HOLLOW FIBER MEMBRANE MODULE

### (57)Abstract:

**PURPOSE:** To obtain the structure capable of uniformly and sufficiently washing the neighborhood of a membrane water collection part by bubbling.

**CONSTITUTION:** In the external pressure type hollow fiber membrane module arranged approximately with a diffuser member 8 for washing, potting parts are set in two stages 2 and 3, and the water collection part 5 is set at the gap of the potting parts set in two stages, and also a diffuser tube 9 is set so as to pass through the potting parts set in two stages, and one end of the diffuser tube 9 set so as to pass through is opened to the diffuser member 8, and the other end is opened to the potting part 2 spreading the hollow fiber membrane.



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(54) 【発明の名称】 中空糸膜モジュール

(57) 【要約】

【目的】 膜集水部近辺がバブリングにより均一かつ充分に洗浄できる構造の中空糸膜モジュールを提供する。

【構成】 洗浄用散気部材8を近接配備した外圧型中空糸膜モジュールにおいて、ポッティング部を2段2、3に設け、該2段に設けたポッティング部の間隙に集水部5を設けると共に、前記2段に設けたポッティング部を貫通して散気チューブ9を設置し、該貫通して設置した散気チューブ9の一端を前記散気部材8に開口し、他端を中空糸膜を張設したポッティング部2に開口したものである。

USF 133913

## 【特許請求の範囲】

【請求項1】 洗浄用散気部材を近接配備した外圧型中空糸膜モジュールにおいて、ポッティング部を2段に設け、該2段に設けたポッティング部の間隙に集水部を設けると共に、前記2段に設けたポッティング部を貫通して散気チューブを設置し、該貫通して設置した散気チューブの一端を前記散気部材に開口し、他端を中空糸膜を張設したポッティング部に開口したことを特徴とする中空糸膜モジュール。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】本発明は、中空糸膜モジュールに係り、特に、河川水、湖沼水、し尿、用水及び廃水などの原水に含まれる懸濁物をろ過するための中空糸膜モジュールに関する。

## 【0002】

【従来の技術】中空糸膜を用いる技術において、膜モジュールの洗浄には通常空気によるバブリングが使用されている。そして、空気によるバブリングは、従来は膜モジュールの外部より散気するのが一般的であった。外部からの散気では膜モジュールの表面のみが散気され、一番膜の閉塞が進む集水部近辺への散気が不十分であった。

【0003】従来の片端又は両端集水型モジュールにおいて、バブリングにより濁質の剥離を行う場合、バブリング用の散気管は膜モジュールの下部に設置していた。下部に集水部がある場合、図3に示すように散気管よりの空気は下部の集水部にあたり、周囲に分散してしまうため、集水部近くのバブリングによる洗浄が充分に行えない。また、例えば図4に示すように、膜間に散気部を挿入して設置しても、膜集水部近辺に対する均一なバブリングはむずかしい。上記のように、従来の洗浄方法においては、透過流束が一番高く膜の閉塞が進む集水部近辺でのバブリング洗浄が不十分であった。

## 【0004】

【発明が解決しようとする課題】本発明は、上記の従来技術の問題点を解決し、膜集水部近辺がバブリングにより均一かつ充分に洗浄できる構造の中空糸膜モジュールを提供することを課題とする。

## 【0005】

【課題を解決するための手段】上記課題を解決するために、本発明では、洗浄用散気部材を近接配備した外圧型中空糸膜モジュールにおいて、ポッティング部を2段に設け、該2段に設けたポッティング部の間隙に集水部を設けると共に、前記2段に設けたポッティング部を貫通して散気チューブを設置し、該貫通して設置した散気チューブの一端を前記散気部材に開口し、他端を中空糸膜を張設したポッティング部に開口することとしたものである。

【0006】上記中空糸膜モジュールにおいて、ポッテ

ィング部及び集水部の形状は、円形、長方形等のいずれの形状でもよく、ポッティング部の材質及び中空糸の材質とか径もいずれでも使用でき、また、散気チューブの材質も通常使用できるものがいずれでも使用でき特に制限はない。

## 【0007】

【作用】本発明によれば、下部集水部の下より直接中空糸膜に散気できるため、散気した空気が集水部に阻害されることなく、膜間に直接散気した空気が進入し、中空糸膜の特に集水部近辺を中心に充分に洗浄することができるものである。

## 【0008】

【実施例】以下、本発明を実施例により図面を用いて具体的に説明するが、本発明はこれに限定されない。

## 実施例1

図1に本発明の中空糸膜の概略断面図を示し、図2に図1のポッティング部の部分拡大図を示す。図1及び図2において、中空糸1は下部ポッティング部A2と上部ポッティング部4で支持されており、下部ポッティング部A2とその下の散気チューブを支持するポッティング部B3との間には密閉された集水部5が設けられ、散気チューブ9が貫通している。

【0009】そして、中空部で処理された水は下部集水部5に集水され、集水部連絡管7を通り上部集水管6に流入して外部に排出される。処理水の排出は下部の集水部5から直接排出してもよい。ポッティング部3の下部には散気された空気を一旦受ける、空気受け部10が設置されている。空気受け部10は下部が開放されていれば、口径がポッティング部と同じでも広がっていてもよい。散気チューブ9は2～5mm程度のチューブでポッティング部A2とB3を貫通し、空気受け部10とポッティング部2上面を連絡している。散気チューブ9はポッティング部2に対し、均一に配置されることが望ましい。散気管11より排出された空気は一旦空気受け部10に流入し、更に、散気チューブ9を通り、ポッティング部2上面より散気される。

【0010】散気は中空糸膜間でかつポッティング部2より行なわれるため、ポッティング部及びその近辺に対する洗浄効果が著しく高くなる。また散気された空気は膜間を通して上昇するため、効率よく洗浄に使用され、両端集水で上部にポッティング部のある場合もポッティング部に直接上昇した空気があたるため、洗浄効果が高くなる。この実施例では、両端集水型の例を示したが、片端集水で集水部が散気管上部にある場合も同様に実施できる。

## 【0011】

【発明の効果】本発明により、集水部近辺での濁質の閉塞がなくなり、閉塞による駆動圧力の上昇が最小限になる。

【図面の簡単な説明】

【図1】本発明の中空糸膜モジュールの一例を示す概略断面図。

【図2】図1の下部ポッティング部の部分拡大図。

【図3】従来の散気による洗浄の説明図。

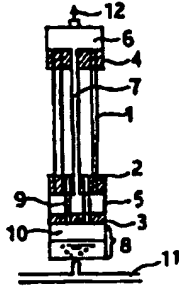
【図4】従来の散気による洗浄の説明図。

【符号の説明】

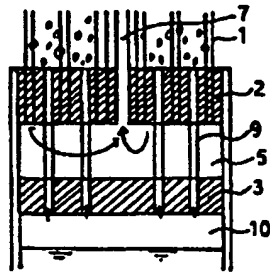
\*

\* 1：中空糸、2：下部ポッティング部A、3：下部ポッティング部B、4：上部ポッティング部、5：集水部、6：上部集水部、7：集水部連絡管、8：散気部、9：散気チューブ、10：空気受部、11：散気管、12：処理水

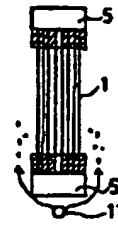
【図1】



【図2】

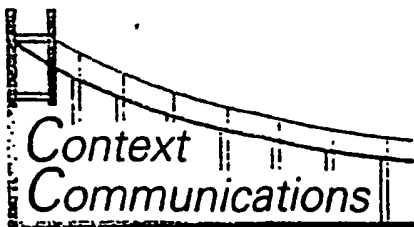


【図3】



【図4】





## Certification

I, Alex Kent, a professional translator, hereby certify that the attached English document,  
Publication of an Unexamined Patent Application 06-343837, is a true and faithful translation  
from the Japanese language.

By Alex Kent Sept. 1, 2004

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(21) Application Number	05-154544	(71) Applicant	000000402 Ebara Inflico Co., Ltd. 6-27 Minatominami, 1-chome Minato-ku Tokyo
(22) Filing Date	June 2, 1993	(72) Inventor	Gi'ichi IIO Ebara Inflico Co., Ltd. 6-27 Minatominami, 1-chome Minato-ku, Tokyo
		(74) Agent	Patent Attorney Katsura YOSHIMINI, (and 1 other)

**(54) Title of Invention: HOLLOW FIBER MEMBRANE MODULE**

**(57) Abstract**

**Purpose**

To provide a hollow fiber membrane module structure capable of uniformly and sufficiently washing the vicinity of a membrane water collection part by bubbling.

**Constitution**

In external pressure-type hollow fiber membrane modules which are provided with an adjacent air diffuser member 8 for washing, potting parts are disposed in two stages 2 and 3, and a water collection part 5 is set at the gap of the potting parts that are disposed in two stages, and also an air diffuser tube 9 is disposed so as to pass through the potting parts that are disposed in two stages, and one end of the air diffuser tube 9 is disposed so as to pass through is

opened to the air diffuser member 8, and the other end is opened to the potting part 2 upon which the hollow fiber membrane is stretched.

**Claims**

**Claim 1**

In external pressure-type hollow fiber membrane modules which are provided with an adjacent air diffuser member for washing.

this is a hollow fiber membrane module in which potting parts are disposed in two stages, and a water collection part is set at the gap of the potting parts that are disposed in two stages, and also an air diffuser tube is disposed so as to pass through the potting parts that are disposed in two stages, and one end of the air diffuser tube is disposed to be open to

the air diffuser member, and the other end is opened to the potting part upon which the hollow fiber membrane is stretched.

#### **Detailed Description of the Invention**

0001

##### **Industrial Field of Use**

This invention relates to hollow fiber membrane modules, and more specifically to hollow fiber membrane modules used to filter suspended material contained in raw water from rivers, lakes, septic tanks, city water, waste water, etc.

0002

##### **Prior Art**

Air is typically used for bubbling in technologies using hollow fiber membranes in order to wash the membrane module. Air bubbling as it is commonly used brings in air diffused from the outside of the membrane module. The air is diffused on the surface of the membrane module in external air diffusion, but insufficient air is diffused in the vicinity of the water collection part, which is the location at which the membrane is most apt to be clogged.

0003

Air diffusion bubbling apparatus has been disposed at the bottom of the membrane module when bubbling is used to peel sludge material in prior art single- or double-ended water collection-type modules. When the water collection part is at the bottom, air from the air diffusion pipes strikes the lower part of the water collection part, as shown in Figure 3, and is dispersed in its vicinity. Therefore, washing action by bubbling near the water collection part is insufficient. Moreover, as shown in Figure 4, even if the air diffusion part is inserted in the gaps, it is difficult to obtain uniform bubbling in the vicinity of the membrane water collection part. Thus, the prior

art washing methods have not been adequately able to perform bubbling washing in the vicinity of the water collection part where the process water flow rate is at its highest and clogging of the membrane is most advanced.

##### **Problems the Invention is Intended to Resolve**

0004

This invention solves the problems described above in the prior art, and its aim is to provide a hollow fiber membrane module with a structure that permits uniform and adequate washing by bubbling in the vicinity of the membrane water collection part.

0005

##### **Means of Solving the Problems**

In order to solve these problems, this is a hollow fiber membrane module in which potting parts are disposed in two stages, and a water collection part is set at the gap of the potting parts that are disposed in two stages, and also an air diffuser tube is disposed so as to pass through the potting parts that are disposed in two stages, and one end of the air diffuser tube is disposed to be open to the air diffuser member, and the other end is opened to the potting part upon which the hollow fiber membrane is stretched

0006

In the hollow fiber membrane module described above, it is acceptable for the shape of the potting part and the water collection part to be either circular, oblong, etc. Further, any material and diameter for the potting part may be used, and any of the typically-used materials for air diffusion tubes may be used without particular restriction.

0007

##### **Operation of the Invention**

The following description of this invention is made with reference to the drawings, but the invention is not limited to these.

#### **Embodiment 1**

Figure 1 shows a schematic cross section of the hollow fiber membrane of this invention. Figure 2 shows a partial enlargement of the potting part in Figure 1. In Figures 1 and 2, the hollow fibers 1 are supported by the lower potting part A2 and the upper potting part 4, a sealed water collection part 5 is disposed between the lower potting part A2 and the potting part B3 that supports the air diffusion tubes beneath the lower potting part A2, and the air diffusion tubes 9 pass through.

0009

Water that is treated by the hollow part is collected by the lower water collection 5, passes through the water collection part connecting pipe 7, flows into the upper water collection pipe 6, and is drained to the outside. The drainage of treated water may also be done directly from the lower water collection part 5. An air receiver part 10, which receives diffused air, is disposed in the lower portion of the potting part 3. If the bottom of the air receiver part 10 is open, it can be as wide as the opening diameter of the potting part. The air diffusion tubes 9, are tubes with a diameter of about 2-5 mm, and they pass through the potting [parts] A 2 and B 3, connecting the air receiver part 10 and the top surface of the potting part 2. The air diffusion tubes 9 should preferably be disposed uniformly relative to the potting part 2. Air that is expelled from the air diffusion pipe 11, first flows into the air receiver part 10, passes once again through the air diffusion tubes 9, and is diffused from the top surface of the potting part 2.

0010

Since air diffusion occurs in between the hollow fiber membranes, and from the potting part 2, the washing effect of the potting part and its vicinity is extremely high. Moreover, since the diffused air is efficiently used for washing because it passes through the gaps and rises, and even when the collection of water at both ends is at the top of the potting part the washing effect is enhanced since the air rises directly in the potting part. This embodiment shows an example where water collection is performed at both ends, but it can be implemented similarly in types where water is collected at one end and the water collection part is at the top of the air diffusion pipe, as well.

0011

#### **Effect of the Invention**

As a result of this invention, sludge clogging in the vicinity of the water collection part is eliminated, and increases in drive pressure due to clogging are minimized.

#### **Brief Description of the Drawings**

Figure 1 Schematic cross section of an embodiment of a hollow fiber membrane module of this invention

Figure 2 Partial enlargement of the lower potting part in Figure 1

Figure 3 Explanatory drawing of prior art air diffusion washing

Figure 4 Explanatory drawing of prior art air diffusion washing

#### **Symbols**

- 1 Hollow fibers
- 2 Lower potting part A
- 3 Lower potting part B
- 4 Upper potting part
- 5 Water collection part

- 6 Upper water collection part
- 7 Water collection part connecting pipe
- 8 Air diffusion part
- 9 Air diffusion tube
- 10 Air receiver part
- 11 Air diffusion pipe
- 12 Treated water

**USF 133920**